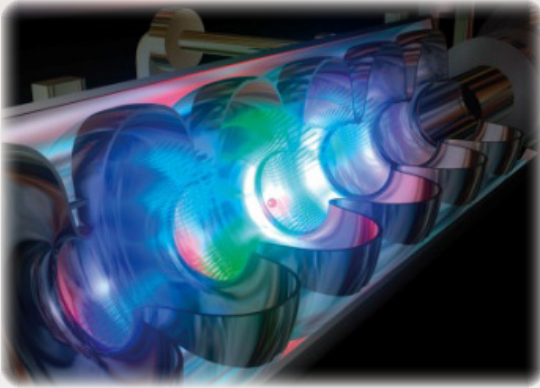




TRIUMF ARIEL



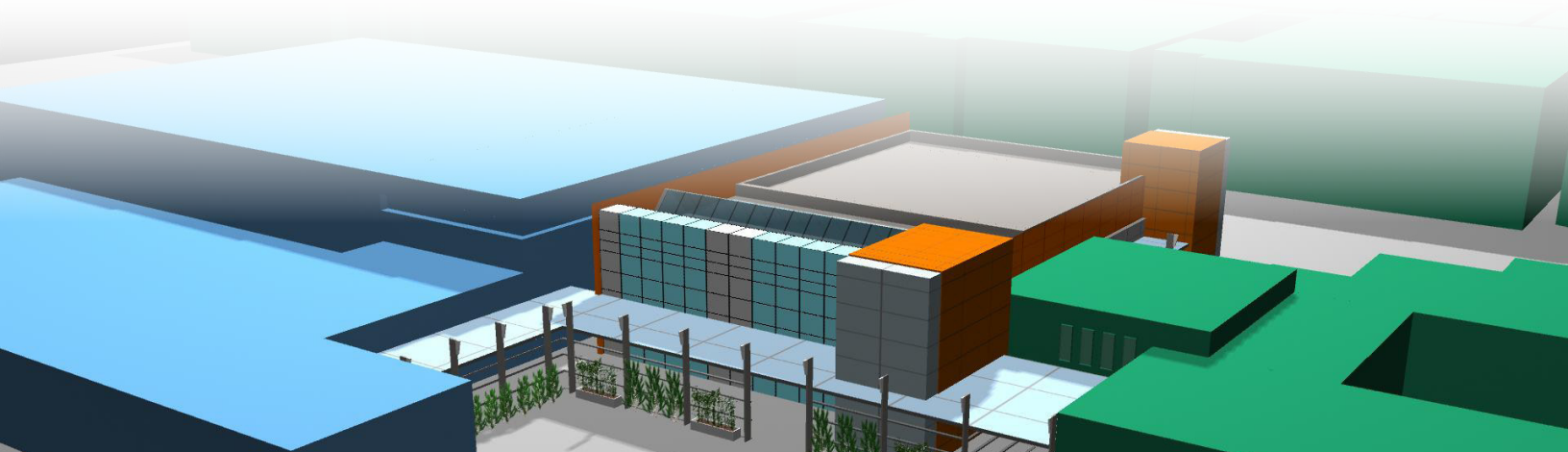
ADVANCED RARE ISOTOPE LABORATORY



ARIEL is a new underground beam tunnel surrounding a next-generation linear accelerator – an e-linac, led by the University of Victoria. The project will allow TRIUMF to develop technology to advance Canada's supply of critical medical isotopes, capitalize on existing investments, and broaden its research capabilities in particle physics, nuclear physics, nuclear medicine, and materials science.

When completed in 2014, ARIEL is expected to:

- Increase TRIUMF's annual scientific productivity to 2-3 times its current level.
- Benefit patients across B.C. and Canada through the emerging personalized-medicine revolution that uses medical isotopes and biomarkers in disease imaging and therapy. With ARIEL, TRIUMF will be able to discover and explore the medical isotopes of the future.
- Enable B.C. and Canada to reduce health-care costs by thousands of dollars per patient as well as expedite treatment and recovery, through TRIUMF's national leadership in molecular imaging.
- Use superconducting accelerator technology for world-class research in particle and nuclear physics, the production of medical isotopes, and environmental remediation.
- Advance TRIUMF's competitive global position in isotope beams (for physics, materials science, and medicine).



What is it?

ARIEL combines the next generation of "Made in B.C." accelerator technology with TRIUMF and the University of Victoria's strengths in research and developing isotopes for physics and medicine. On the lower floors of ARIEL will be an e-linac that will produce an intense beam of electrons travelling at light speeds. An underground beam tunnel will connect the accelerator to the isotope-production area, where the beam of electrons will be converted and directed on targets made of beryllium, tantalum, and so on. The isotopes will be extracted in real time and sent to experimental areas in non-stop "streams" of exotic nuclei.

Did you know...

- ARIEL will be designed to LEED Gold standards.
- The e-linac will use 100 kg of pure niobium, a superconducting metal, for every three accelerating cavities.
- To build ARIEL, over 8,000 cubic yards of concrete will be needed and 20,000 cubic yards of earth will be moved. Some of the walls in ARIEL are 9 feet thick.

What is it good for?

ARIEL will push the frontiers of knowledge and have profound impacts on isotopes for physics, isotopes for medicine, and next-generation accelerators.

Isotopes for Physics

ARIEL will produce exotic isotopes, such as Tin-132, that will probe what holds nuclei together and will reveal the steps used by supernova for producing the chemical elements that make up human life. This Prize-winning research will map out the evolution of our universe.

Isotopes for Medicine

ARIEL will develop new approaches for producing today's isotopes and will develop the medical isotopes of the future for diagnosing and treating diseases. For instance, Astatine-211 will be studied to benchmark its role in treating brain cancer by delivering radiation directly and in situ to the tumour.

Accelerator Science & Technology

The core technology for ARIEL and the e-linac is of widespread value and saves electrical energy compared to conventional technology by roughly a factor of 5. An industrial partner, PAVAC Industries, is developing an application to use the same accelerator technology for scrubbing noxious pollutants from flue gasses.

When will it be ready?

Construction on the ARIEL facility and e-linac will begin July 1, 2010, providing immediate stimulus to the civil-construction and technical communities in B.C. and Canada. The ARIEL facility will be completed in 2013 and then the e-linac will be installed. Isotope production for physics and medicine will be commissioned in 2014 and 'round-the-clock operations will be routine in 2015.

Who is supporting it?

ARIEL is a \$62.9 million project based at TRIUMF, Canada's national laboratory for particle and nuclear physics. The Government of British Columbia is contributing \$30.7 million, and the Canada Foundation for Innovation is contributing \$17.8 million through the University of Victoria for the e-linac. In addition, TRIUMF's core operating budget and partners in India and the U.S. will contribute \$14.4 million.